Studies on the effects of high pressure on the motility of animal tissues : I. The excitability of the voluntary muscle of frog

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STUDIES OF THE EFFECTS OF HIGH PRESSURE ON THE MOTILITY OF ANIMAL TISSUES

1. The Excitability of the Voluntary Muscle of Frog

By Seigo Funaoka and Tsukasa Hashikawa

Methods A nerve-muscle preparation of a frog's gastrocunemius was kept in Ringer's solution in the high pressure range, 100–3500 kg/cm² by the high pressure apparatus set in the Physico-Chemical Laboratory, College of Science (Kyoto University), and after this previous treatment the excitability of the muscle was examined by the galvanic stimulation.

Results The fine structure of the muscle fibres is never destroyed by a pressure of 2500 kg/cm² for 30 minutes. However, the excitability of muscle is lost by a high pressure of a further low grade. After a 30 minutes' delay under a pressure of 250 kg/cm² the gastrocunemius of a frog is able to react on the galvanic stimulation neither from the sciatic nerve nor directly on the muscle.

By a pressure of 225 kg/cm² for 30 minutes the muscle does not contract, if the muscle is stimulated from the nerve, but its excitability through a direct stimulation is preserved.

If the gastrocunemius of frog is kept 30 minutes long under 200 kg/cm², it shows a prompt contraction on both the stimulations from the nerve and directly on the muscle. In this case, however, the latent period seemed slightly protracted.

The following table contains the results of experiments obtained under high pressures.

Pressure kg/cm²	Dulation of pressure (minutes)	Excitability of frog's gastrocunemius, stimulated	
		from the nerve	directly on the muscle
150	30	+	+
200	30	+	+
200	60	+	+
200	90	+	+
225	30	−	+
250	5	+	+
250	10	+	+
250	30	−	−
300	5	+	+
300	10	±	±
300	30	−	−